

Some Problems in the Physics (Cont.)

SOV/4609

Crystallography AS USSR) to give a systematic account of the present state of studies in the strength and plasticity of crystals. The introductory article reviews the history of Soviet progress in developing theories of the mechanical properties of crystals, mainly single crystals. Names of leading Soviet and non-Soviet specialists in this field are mentioned. The articles discuss plastic properties of a single-crystal grain (crystallite). Fundamental data on the incomplete (block) structure of single crystals and polycrystalline grains, and on the structure and properties of interfaces between the grains of crystal groups [i.e., grain boundaries] are also reviewed. References accompany the articles.

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Some Problems in the Physics (Cont.)

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JA/rn/ec  
1-4-61

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KLASSEK-HRKL'YUDOVA, Marina Viktorovna. Prinimali uchast'ye: INDENBOM,  
V.L.; URUSOVSKAYA, A.A.; TOMILOVSKIY, G.Ye.; PONYATOVSKIY,  
Ye.G. OBRNIMOV, I.V., akademik, otv.red.; STAROKADOMSKAYA,  
Ye.L., red.isd-va; SHIVCHENKO, G.N., tekhn.red.; BRUZGUL', V.V.,  
tekhn.red.

[Mechanical twinning of crystals] Mekhanicheskoe dvoynikovanie  
kristallov. Moskva, Izd-vo Akad.nauk SSSR, 1960. 261 p.  
(MIRA 14:1)

1. Laboratoriya mekhanicheskikh svoyst kristallov Instituta  
kristallografii (for Indenbom, Urusovskaya, Tomilovskiy). 2. Labo-  
ratoriya vysokikh davleniy Instituta kristallografii (for Ponya-  
tovskiy).

(Crystals)

100

INDENBOM, V.L.

Description of the simpler phenomena of plastic bending from the  
standpoint of the dislocation theory. Itogi nauki: Fiz.-mat. nauki  
3:117-158 '60. (MIRA 13:7)  
(Deformations (Mechanics)) (Dislocations in crystals)

24.7300

78108  
SOV/70-5-1-17/30

AUTHOR: Indenbom, V. L.

TITLE: Phase Transitions Without Altering the Number of Atoms  
in the Unit Cell of a Crystal

PERIODICAL: Kristallografiya, 1960, Vol 5, Nr 1, pp 115-125 (USSR)

ABSTRACT: Developing L. D. Landau's idea on the physical  
properties of crystals as the function of their  
structure (Soviet Phys., 11, 26, 545, 1937), the  
author analyzes the thermodynamic potential  $\Phi$   
of crystals as the function of their structure,  
particularly of density  $\rho(x, y, z)$ . The latter is  
defined by:  $\rho = \sum_i c_i \varphi_i(x, y, z)$ , where  $c_i$  is a coefficient

consistent with the degree of freedom inherent to a  
given structure, and  $\varphi_i$  is a function which can be  
derived for any new phase from that of the phase whose  
space group was altered due to the phase transition.

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Phase Transitions Without Altering the  
Number of Atoms in the Unit Cell of a  
Crystal

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The expanded form of the equation is a Fourier series when the symmetry operations are restricted to translations, but becomes more complex if rotation, reflection, etc. are involved. In any event, solution for  $\Phi$  as a function of  $c_1$  can produce

several minima consistent with the possible number of polymorphous modifications of the crystal. Thus, the conjugation of  $\Phi$  values determines all the possible phase transitions of the first and second orders. Different point groups permit different degrees of freedom as tabulated below:

$C_1$	...0	$D_{2h}, C_{4h}, D_{3d}, D_{2h}, D_6, C_{6h} \dots$	7
$C_1, C_2, C_3$	...1	$T_d, O$	...9
$C_2$	...2	$D_{4h}, C_{6h}, T_h$	...11
$C_{2h}, D_2, C_{2v}, C_4, S_4, D_2, C_{4v}$	...3	$D_{6h}$	...15
$D_4, C_{4v}, D_{2d}, S_4, C_{3h}, C_6, T$	...5	$O_h$	...19

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Phase Transitions Without Altering the  
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and some additional freedoms which reduce the symmetry. Ferroelectric and ferromagnetic phase transitions, spontaneous polarization, and elastic constants are analyzed in connection with these freedoms, and the properties of some point and space groups are tabulated; phase transitions of second order are shown in Fig. 4. The expanded expression of  $\Phi$  in terms of  $c_i$  can only

be applied to those phase transitions of first order at which the lattice becomes just slightly distorted, such as at the transition from a group to its subgroup. The concepts describing ferroelectric phase transitions as the result of polarization can not always be justified; present theories on the subject are not even able to examine all the transitions at which the number of atoms in a unit cell changes. It is therefore suggested that the theories on both ferroelectricity and antiferroelectricity be supplemented with the results of the author's studies. Magnetic symmetry (on which

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Phase Transitions Without Altering the  
Number of Atoms in the Unit Cell of a  
Crystal

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Shubnikov's additional classes of symmetry are based) is not considered. M. V. Klassen-Neklyudova, V. L. Ginzburg, and Ye. M. Lifshits are acknowledged for advice. There are 4 figures; 3 tables; and 11 references, 10 Soviet, 1 U.S. The U.S. reference is: W. Känzig, Solid State Physics, 4, 1-197, 1957.

ASSOCIATION: Crystallographical Institute of the Academy of Sciences,  
USSR (Institut kristallografii AN SSSR)

SUBMITTED: July 6, 1959

Card 4/6

S/070/60/005/004/002/012  
E132/E360

AUTHORS: Indenbom, V.L., Belov, N.V., and Neronova, N.N.

TITLE: The Point Groups of Colour Symmetry (Coloured  
Classes)

PERIODICAL: Kristallografiya, 1960, Vol. 5, No. 4,  
pp 497 - 500 + 1 plate

TEXT: The concept of colour symmetry is applicable not only to plane and space groups but also to the point groups. For two colours there will be 58 (magnetic) classes. The coloured point groups have been derived before (O. Wittke and J. Garrido, Bull. Soc. franc. miner.cristall., 223-30, 1959) but in this case are lost among the 211 ways of colouring polyhedra which the authors described. All the 18 multicoloured classes are listed and illustrated by coloured figures. The ordinary 32 point groups have, in all, 18 pairs of complex conjugate one-dimensional representations. These are listed and each is shown to correspond to a colour group. In the notation primes indicate the coloured element. The parent group is given first:

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E132/E360

The Point Groups of Colour Symmetry (Coloured Classes)

4-colour groups -  $C_4$  gives  $4'$ ;  $S_4$ ,  $4'$ ;  $C_{4h}$ ,  $4'/m$  and  $4'/m'$ ;

3-colour groups -  $C_3$  gives  $3'$ ;  $C_6$ ,  $3'.2$ ;  $S_6$ ,  $3'.1$  and  $3'.1'$ ;

$C_{6h}$  gives  $3'.2/m$  and  $3'.2/m'$ ;  $T$ ,  $2.3'$ ;  $T_h$ ,  $m3'$ ;

$C_{3h}$ ,  $3'/m$  and  $3'/m'$ ;

6-colour groups -  $C_6$  gives  $3'.2'$ ;  $C_{6h}$ ,  $3'.2'/m$ ;  $3'.2'/m'$ ;  $T_h$ ,  $m'3'$ .

There are 7 tables and 6 references: 5 Soviet and 1 French.

ASSOCIATION: Institut kristallografi AN SSSR  
(Institute of Crystallography of the AS SSSR)

SUBMITTED: February 3, 1960

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APPROVED FOR RELEASE: 08/10/2001

CIA-RDP86-00513R000618610012-6

S/070/60/005/004/016/XX  
E132/E460

24,7900

AUTHOR: Indenbom, V.L.

TITLE: The Irreducible Representations of the Magnetic Groups and the Calculation of Magnetic Symmetry

PERIODICAL: Kristallografiya, 1960, Vol.5, No.4, pp.513-516

TEXT: It has been shown earlier (Krist.4, 619, 1959) that the application of group theory to the magnetic structure of crystals is simplified by the isomorphism of the magnetic groups have the usual (Fedorov) groups. Hence any problem in crystal physics involving the magnetic representations of the magnetic (Shubnikov) and the well-known representations of the usual groups if it is clear which representation the physical magnitudes we are interested in transform according to. The magneto-electric effect, the linear dependence of the electrical and magnetic fields in some ferromagnetics and antiferromagnetics, is taken as an example. The irreducible representations of the 58 magnetic groups (black and white point groups) according to which the components of the magnetic field transform are tabulated. The 11 different forms (different systems of equalities relating certain of the 9 components) which the second order tensor of the magneto-

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S/070/60/005/004/013/016/XX  
E132/E460

The Irreducible Representations of the Magnetic Groups and the  
Calculation of Magnetic Symmetry

electric polarizability can have are also tabulated according to  
the 11 different symmetries which the effect takes in the  
40 magnetoelectric classes. Acknowledgments to A.A.Gusev for  
a stimulating discussion and to B.K.Sevast'yanov for evaluating and  
checking the results. There are 2 tables and 7 Soviet references.

ASSOCIATION: Institute kristallografii AN SSSR  
(Institute of Crystallography AS USSR)

SUBMITTED: February 3, 1960

Card 2/2

84993

24,7300 (1043, 1145, 1160)

S/048/60/024/010/002/033  
B013/B063

AUTHOR: Indenbom, V. L.

TITLE: The Thermodynamic Theory of Piezoelectricity

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1960,  
Vol. 24, No. 10, pp. 1180-1183

TEXT: Two types of piezoelectric phase transitions are dealt with, which are not covered by the classical theory. Two conditions must be observed in order that the crystal symmetry allows a piezoelectric phase transition of the second order: 1) the condition of the crystal must be stable in the point of transition; 2) the phase transition must yield a homogeneous and no layered crystal. For all of the nonpyroelectric classes, the respective invariants are given. All possible piezoelectric transitions, in which the polarization serves as a parameter, can be obtained by completing the dissociation (1)  $\Phi(\vec{P}) = \Phi_0 + \alpha_{ij} P_i P_j + \beta_{ijkl} P_i P_j P_k P_l + \dots$  ( $\vec{P}$  - polarization vector) of the thermodynamic potential in a series according to even powers of the component of the polarization vector  $\vec{P}$ . If the pyroelectric phase results due to a phase transition, in which the number of

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The Thermodynamic Theory of Piezoelectricity

81993  
S/048/60/024/010/002/033  
B013/B063

atoms in the elementary cell of the crystal changes, such a piezoelectric phase transition cannot be described with the aid of a polarization vector. In this case no vector or tensor quantities may serve as parameters for the transition (Ref. 3). As a consequence, in this case spontaneous polarization can be no effect of the second or of a higher order. In all cases where the polarization does not serve as a parameter of piezoelectric transformation, transition does not take place in the highest subgroup of the initial space group, but in a subgroup with lesser symmetry. Apparently more than half of the known piezoelectric transitions belong to this very class, which is not covered by the classical theory. The theory formulated in Ref. 3 can be used to describe such transitions, provided the number of atoms remains unvaried in the elementary cell. Otherwise, space group notions must be taken over. The author thanks V. A. Koptsik for his contribution to the study. Mention is made of L. D. Landau and G. Ya. Lyubarskiy. The present paper was read at the Third Conference on Piezoelectricity, which took place in Moscow from January 25 to 30, 1960. There are 5 Soviet references.

ASSOCIATION: Institut kristallografii Akademii nauk SSSR  
(Institute of Crystallography of the Academy of Sciences  
USSR)

card 2/2

24.7500  
18.8200

25694 S/181/61/003/007/016/023  
B104/B203

AUTHOR: Indenben, V. L.

TITLE: Destruction criteria in the dislocation theories of strength

PERIODICAL: Fizika tverdogo tela, v. 3, no. 7, 1961, 2071 - 2079

TEXT: The author describes a simple method of investigating the energy gain in the development of straight cracks. This method is applied to various types of crack formation. In the first part, the author studies crack formation in any field of internal stresses. He indicates the rela-

tion  $\sigma(x) = \frac{AB}{2\pi} \int_{-\infty}^{+\infty} \{\beta(x')/(x-x')\} dx'$  (1) for the stresses  $\sigma(x)$  caused by

the dislocation density  $\beta(x)$  in the plane  $y = 0$ . Here, the indices are omitted. The solution of (1) by the Keldysh-Sedov method leads to an an-

alytic function  $f(x+iy) = \int_{x_1}^{x_2} \beta(x') dx'/(x+iy-x')$ . The stress concentration

before the crack fronts can then be indicated by the expression

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Destruction criteria in...

$\sigma(x) = \frac{\bar{\sigma}}{2} \sqrt{L/(x_1-x)+\dots}$ ,  $0 < x_1-x \ll L$ , where  $\bar{\sigma}$  is the mean weighted stress which acts at the section  $(x_1, x_2)$  of the length  $L$  until the formation of the crack. Referring to G. R. Irwin (J. Appl. Mech., 24, 361, 1957), the author studies the configuration force effecting the growth of cracks. This force corresponds to the energy released in the formation of the crack and is proportional to the radius of the elastic curvature of the crack opening, or proportional to the square mean weighted stress along the crack length. Referring to A. N. Stroh (Phil. Mag., 3, 625, 1958) and G. I. Barenblatt (PMM, 23, no. 4, 706, 1959), the author obtains the criterion  $\bar{\sigma} = \sqrt{8A\gamma/\pi L}$ , where  $A$  is a coefficient in the formula  $\sigma = Ab/2\pi x$  which describes the stress distribution caused by a screw dislocation, and where  $b$  is the Burgers vector. In the case of homogeneous dilatation, this criterion passes over into the Griffiths criterion. Further, with the aid of the above-mentioned criterion for the equilibrium length of a crack, the result of Stroh (Phil. Mag., 223, 404, 1954) is obtained:

$L = n^2 Gb^2 / 8\pi(1-\nu)\gamma$ . Hence follows the criterion for the destruction:  
 $\sigma_n = 8\gamma/nb$ , where  $\sigma_n$  is the outer normal stress acting on the crack surface.

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Destruction criteria in...

With the aid of the Ziner-Mott diagram which is frequently used in the destruction theory, the author shows, proceeding from the Stroh distribution

$$\left. \begin{aligned} \frac{\sigma_1 + \sigma_2}{2\sigma_0} &\sim \sqrt{\frac{L}{r}} \sin \frac{\theta}{2}, \\ \frac{\sigma_1 - \sigma_2}{2\sigma_0} &\sim \sqrt{\frac{L}{r}} \sin \frac{\theta}{2} \left(1 + \cos \frac{\theta}{2} \cos \frac{3\theta}{2}\right), \\ \frac{\tau}{\sigma_0} &\sim \sqrt{\frac{L}{r}} \cos \frac{\theta}{2} \left(1 - \sin \frac{\theta}{2} \sin \frac{3\theta}{2}\right). \end{aligned} \right\} \quad (17)$$

of stresses in the head of accumulations, that cracks grow without impediment as soon as the inequality  $\tau_0 \geq 3\pi^2 \gamma / 8nb$  is fulfilled. In the two closing parts, the author investigates the opinion saying that cracks are the result of sliding in a twisted lattice, and cracks which are connected with the steps in dislocation walls. The above-mentioned opinion was suggested by V. N. Rozhanskiy (DAN SSSR, 123, 648, 1958) and J. J. Gilman (Trans. AIME, 222, 783, 1958). The results obtained here by applying the method of configuration forces may be regarded as an interpretation of a

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Destruction criteria in...

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B104/B203

nonlinear theory considering the geometric nonlinearity of sliding in a twisted lattice. It is possible that this nonlinearity causes destructions not only in the slip planes. There are 3 figures and 11 references: 3 Soviet-bloc and 8 non-Soviet-bloc..

ASSOCIATION: Institut kristallografii AN SSSR Moskva (Institute of Crystallography AS USSR, Moscow)

SUBMITTED: February 20, 1961

Card 4/4

24,7500 (1144,1160,1482)

22791  
S/070/61/006/003/005/009  
E036/E435

AUTHORS: Nikitenko, V.I. and Indenbom, V.L.

TITLE: Comparison of stresses and dislocations in a germanium crystal

PERIODICAL: Kristallografiya, 1961, Vol.6, No.3, pp.432-438

TEXT: Using photoelasticity, the distribution of stresses across a slice from a germanium ingot is measured. The stress field is calculated and the corresponding temperature field is compared with the dislocation distribution. The slice investigated was cut parallel to the (111) plane and the distribution of dislocations determined from etch pits. Bi-refringence was measured between the slice faces along two slice diameters using infrared radiation. The amount of bi-refringence was determined by placing the sample between crossed polaroids and measuring directly by means of photoconductivity as well as the usual quartz wedge and Senarmont compensator. Scatter of results by the three methods was 10 to 20%. A plot of path difference along the diameter gives a parabolic law with the exception of parts close to dislocation clusters. The photoelastic constants required to  
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X

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S/070/61/006/003/005/009  
E036/E435

## Comparison of stresses ...

convert the bi-refringence into stresses were found by compressing prisms of various orientations. Scatter is large but no worse than other workers have experienced on Si and diamond. From the stresses and using Yu.I.Sirotn's results (Ref.13: Kristallografiya, 1, 6, 708-717, 1956) the stresses in the ingot, at the place where the slice was removed, can be calculated. From these, using a method due to E.Billig (Ref.15: Proc.Roy.Soc. A, 235, 1200, 37-55, 1956), the dislocation density is calculated and compared with the experimental determination and this is shown in Fig.4, where dislocation density ( $10^2\text{cm}^{-2}$ ) is plotted against distance along the diameter ( $r/R$ ),  $R$  being the slice radius. The line is the calculated distribution and the points are the experimental values. The results are similar to those obtained by P.Penning (Ref.17: Philips Res. Repts, 13, 1, 79-97, 1958). The discrepancies between observation and calculation are thought to be due to the dislocations not completely compensating the temperature drop and the thermoelastic stresses which arise. The tangential stresses determined in the experiment also agreed qualitatively with the dislocation distribution. Information can be obtained about the thermoelastic stresses acting during the

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22794

S/070/61/006/003/005/009  
E036/E435

Comparison of stresses ....

crystal pulling. Acknowledgments are expressed to G.I.Distler and V.I.Chudakov for their assistance. There are 4 figures, 2 tables and 17 references: 6 Soviet-bloc and 11 non-Soviet-bloc. The four most recent references to English language publications read as follows: R.Bullough, Phys.Rev., 115, 4, 723-726, 1957; J.Hornstra, P.Penning, Philips Res.Repts, 14, 3, 237-249, 1959; S.R.Lederhandler. J.Appl.Phys., 30, 11, 1631-1638, 1959; P.Penning. Philips Res.Repts, 13, 1, 79-97, 1958.

ASSOCIATION: Institut kristallografii AN SSSR  
(Institute of Crystallography AS USSR)

SUBMITTED: August 12, 1960

Card 3/4

20636

S/020/61/136/006/012/024  
B104/B204

24.7500

1136, 1143, 1137, 1160

AUTHORS: Rozhanskiy, V. N. and Indenbom, V. L.

TITLE: Accumulations of dislocations in crystals containing impurities

PERIODICAL: Doklady Akademii nauk SSSR, v. 136, no. 6, 1961, 1331-1334

TEXT: Theoretical calculations concerning the strengthening and destruction of crystal bodies have hitherto always been made on the assumption that the dislocations are always able to move freely along the slip planes. However, it was found in the course of experimental investigations that the distribution of dislocations does not agree with theoretical assumptions. The authors presume that this is caused by the fact that in previous papers, the effect produced by impurities and defects, which may increase the resistance to a displacement of dislocations, is taken into account. On the other hand, the conceptions concerning the formation of large accumulations of freely moving dislocations forming the basis of some theories on the destruction of crystals, have recently been the

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B104/B204

Accumulations of dislocations in ...

cause of considerable doubts, as the existence of strong barriers, which might resist large groups of freely moving dislocations, is very improbable. The authors suggest another scheme for the accumulation of dislocations, in which blocked impurities are the cause of the formation of accumulations (Fig. 1). If two dislocations are arranged at a distance of  $l_1$  from each other, and if the second dislocation produces a tangential stress  $\tau$  at the place of the first, then the second dislocation can be determined from the equilibrium condition for the external forces and the interaction forces of the dislocations. With a small neglect, the relation  $l_1 = Gb/2\pi k\tau$  (1) holds. In consideration of a third dislocation, the following holds:  $\tau = \frac{G}{2\pi k} \left( \frac{1}{l_1 + l_2} + \frac{1}{l_2} \right)$ ,

from which it follows that  $\frac{1}{l_1} = \frac{1}{l_1 + l_2} + \frac{1}{l_2}$ . By the substitution

$l_1 = a_1 l_1$ , the last relation assumes the form  $1 = \frac{1}{a_1 + a_2} + \frac{1}{a_2}$ , and

in the further course, the system

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Accumulations of dislocations in ...

$$l = \frac{1}{a_1},$$

$$l = \frac{1}{a_1 + a_2} + \frac{1}{a_2},$$

(4)

$$l = \frac{1}{a_1 + a_2 + a_3} + \frac{1}{a_2 + a_3} + \frac{1}{a_3},$$

$$l = \frac{1}{a_1 + \dots + a_n} + \frac{1}{a_2 + \dots + a_n} + \dots + \frac{1}{a_n}.$$

is constructed, and it is shown that for great values of  $n$  the relation  
 $a_n \approx \gamma + \ln n + \frac{\pi^2/6 - 1}{\gamma + \ln n}$  (5) holds. Herefrom the following expression  
 follows for the length of the accumulation:

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20b,6

Accumulations of dislocations in ...

S/020/61/136/006/012/024  
B104/B204

$$L_{n+1} = L_1 \sum_{m=1}^n a_m \approx \int_1^n dm \left( \gamma + \ln m + \frac{\pi^2/6 - 1}{\gamma + \ln m} \right) =$$

$$= L_1 (n \ln n + (n-1)(\gamma-1) + (\pi^2/6 - 1) e^{-\gamma} [Ei(\gamma + \ln n) - Ei(\gamma)]), \quad (6)$$

In Fig. 2, the results calculated from (5) and (6) are compared with those calculated from (4), wherefrom the applicability of the approximations (5) and (6) may be seen. It is then noted that the model suggested here is in agreement with the experimental results in a number of cases. There are 3 figures, and 4 non-Soviet-bloc references.

ASSOCIATION: Institut kristallografi i Akademii nauk SSSR  
(Institute of Crystallography of the Academy of Sciences USSR)

PRESENTED: August 2, 1960, by A. V. Shubnikov, Academician

Card 4/6

S/020/61/141/006/013/021  
B104/B112

AUTHORS: Indenbom, V. L., Nikitenko, V. I., and Milevskiy, L. S.  
TITLE: Observation of internal stresses around dislocations in silicon  
PERIODICAL: Akademiya nauk SSSR. Doklady, v. 141, no. 6, 1961, 1360 - 1362

TEXT: The observation of decorated and nondecorated dislocations in silicon by an electron-optical transducer is described. The experimental arrangement consisted of a usual polarization microscope (with Nicol prisms) and a БЭМ-3 (BEI-3) electron-optical transducer. An OM-24 (OI-24) lamp with infrafilter was used as light source. Dislocations were oriented strictly parallel to the direction of observation by a special breeding method. Crystal breeding was carried out in direction  $[110]$ . 2 - 3 mm thick plates were cut out at right angles to the breeding axis, and polished. As was shown by experiments with polarized light, there exists a birefringence field of rosette-shaped character in the vicinity of dislocations.

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S/020/61/141/006/013/021  
B104/B112

Observation of internal stresses...

This agrees with results of a previous paper by V. L. Indenbom et al. (Kristallographiya, 2, 190 (1957)) according to which the birefringence field around dislocations (when the crystal is considered to be isotropic) can be described by the formula  $r = C \cos \theta \cos^2 (\theta - \alpha)$ .  $\theta$  is the azimuth counted from the slip plane,  $\alpha$  is the angle between this plane and the polarization plane,  $C$  is a constant proportional to the marginal component of the Burgers vector of dislocation, to the hardness of the crystal, and to the photoelastics constant. The pattern of microstresses around dislocations changes completely after decorating. The rosette changes, and the signs of birefringence in the individual rosette fields which differed before decorating become equal. Microstresses around decorated dislocations are radially compressed and tangentially elongated. In usual decorating, intensity of the microstresses around dislocations increases somewhat, original microstresses disappear, and curvilinear dislocations may be observed besides rectilinear ones. Only macrostresses produced by the effect of many dislocations are conserved. Redistribution of stresses around dislocations decreases with decreasing impurities. The authors thank Professor M. V. Klassen-Neklyudova for interest and V. D. Khvostikova

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Observation of internal stresses...

S/020/61/141/006/013/021  
B104/B112

for assistance in crystal breeding. There are 3 figures and 9 references: 5 Soviet and 4 non-Soviet. The three most recent references to English-language publications read as follows: W. L. Bond, J. Andrus, Phys. Rev., 101, 1211 (1956); R. Bullough, Phys. Rev., 110, 620 (1958); W. C. Dash, J. Appl. Phys., 29, 705 (1958).

ASSOCIATION: Institut kristallografii Akademii nauk SSSR (Institute of Crystallography of the Academy of Sciences USSR)  
Institut metallurgii im. A. A. Baykova Akademii nauk SSSR  
(Institute of Metallurgy imeni A. A. Baykov of the Academy of Sciences USSR)

PRESENTED: June 5, 1961, by A. V. Shubnikov, Academician

SUBMITTED: May 30, 1961

Card 3/3

INDENBOM, V. L.,

"Significance of internodal intersections in creep phenomena."

report to be submitted for the Intl. Symposium on Mechanical Aspects of  
Lattice Defects (IUPAP), Tokyo, Japan 3-4 Sep 1962.

INDENBOM, V. L.

"Role of Interstitial Intersections in Creep Phenomena "  
Paper was submitted at the International Conference on Crystal  
Lattice Defects at Kyoto, 7-12 Sep '62

Inst. of Crystallography, Acad. of Sci. USSR, Leninsky Prospect  
59, Moscow, V-333

L.18904-63

EWI(q)/EWI(m)/BDS AFFTC/ASD JD

ACCESSION NR: AT3001909

S/2912/62/000/000/0168/0174

AUTHORS: Indenbom, V.L., Nikitenko, V.I., Milevskiy, L.S. 58  
56

TITLE: Dislocational structure of Si. 27

SOURCE: Kristallizatsiya i fazovyye perekhody\*, Minsk, Izd-vo AN BSSR, 1962, 168-174.

TOPIC TAGS: crystal, crystallization, crystallography, crystalline, structure, dislocation, single crystal, growth, defect, slippage, etching, decoration, Si.

ABSTRACT: The paper describes a comparative evaluation of various methods for the inspection of dislocational structures in Si, with particular emphasis on the polarized-light optical method. A comparison of the results of various methods in the discovery of dislocations in a thin lamina of Si is shown. The lamina was cut perpendicularly to the axis of an ingot grown along {110} by the Chokhralskiy method. The methods are: Photography in polarized IR light, selective etching, and Cu decoration of the dislocations. The characteristics of the images obtained are discussed in detail. The atomic scheme of the formation of edge dislocations is illustrated for three possible arrangements: (a) two  $60^\circ$  dislocations placed at a distance of one lattice parameter; (b) formation of an edge dislocation; (c) edge

Card 1/2

L 18904-63

ACCESSION NR: AT3001909

2

dislocation with the same orientation arising upon slippage along the (001) plane in the direction of easiest slippage. The graphs include an indication of the Burgers vector. It is concluded that the optical method for the investigation of dislocations is a valuable adjunct in the solution of the problem of inspecting and controlling the dislocational structure of a growing crystal. "In conclusion, the authors regard it their pleasant duty to express their gratitude to Prof. M. V. Klassen-Neklyudova for her attention to the study, and to D. B. Khvostikova for her kind cooperation in the growing of crystals." Orig. art. has 4 figures.

ASSOCIATION: 00

SUBMITTED: 00

DATE ACQ: 16Apr63

ENCL: 00

SUB CODE: CH, PH, MA, EL.

NO REF SOV: 006

OTHER: 003

Card 2/2



33361

S/181/62/004/001/036/052  
B104/B112

24,7500 (1144, 1160, 1482)

AUTHORS: Indenbom, V. L., Nikitenko, V. I., and Milevskiy, L. S.

TITLE: Polarization-optical analysis of the dislocation structure of a crystal

PERIODICAL: Fizika tverdogo tela, v. 4, no. 1, 1962, 231 - 235

TEXT: The polarization-optical method makes it possible to establish all the characteristics of the dislocation structure in crystals of low dislocation density. A plate with a perpendicular  $[001]$  axis, cut out of a Si single crystal parallel to the  $(110)$  plane, was used for determining the Burgers vector and for investigating various types of dislocation, such as sessile dislocations (Fig. 2) and dislocations with glide planes coinciding with the  $(111)$  and  $(\bar{1}\bar{1}1)$  planes ( $60^\circ$  dislocations). The formation of sessile dislocations from the  $60^\circ$  dislocations is described by  $\frac{a}{2} [101] + \frac{a}{2} [0\bar{1}\bar{1}] \rightarrow \frac{a}{2} [1\bar{1}0]$ , according to which one  $60^\circ$  dislocation glides along the  $(\bar{1}\bar{1}1)$  plane and hits the other  $60^\circ$  dislocation gliding along the  $(111)$  plane. The Burgers vectors of the  $60^\circ$  dislocations form Card 1/32

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S/181/62/004/001/036/052

B104/B112

Polarization-optical analysis of the...

an angle of  $120^\circ$ . The planes of easiest gliding of dislocations form a tetrahedron in a diamond-type lattice. The Burgers vector of the dislocation resulting from the above reaction is perpendicular to the edge of the tetrahedron which is parallel to the dislocation. The atomic mechanism underlying the above reaction is discussed in detail. It is shown that neither the direction of the Burgers vector nor the gliding planes of dislocations formed according to this mechanism coincide with the planes of easiest gliding. V. D. Khvostikov is thanked for having grown the crystal, and Professor M. V. Klassen-Neklyudova for her continuous interest. There are 5 figures and 5 references: 3 Soviet and 2 non-Soviet. The two references to English-language publications read as follows: G. Echart, S. Lederhandler, Bul. Am. Phys. Soc., ser. II, 5, 1, 25, 1960; J. Hornstra, J. Phys. Chem. Sol., 5, 1-2, 129, 1958.

ASSOCIATION: Institut kristallografii AN SSSR Moskva ( Institute of Crystallography, AS USSR, Moscow)

SUBMITTED: August 9, 1961

Card 2/2

KONOBAYEVSKIY, S.T.; INDENBOM, V.L.

Comparing microscopic and phenomenological creep theories. Fiz.  
met. i metalloved. 16 no.4:639-640 0 '63. (MIRA 16:12)

8/053/62/076/003/005/005  
B125/B1 02

AUTHORS: Indenbom, V. L., Orlov, A. N.

TITLE: Physical theory of plasticity and strength

PERIODICAL: Uspekhi fizicheskikh nauk, v. 76, no. 3, 1962, 557-591

TEXT: The present review paper deals with the physical theory of plasticity and strength on the basis of papers published since 1924. There are 17 figures and 89 references: 36 Soviet and 53 non-Soviet.

Card 1/1

INDENBOM, V. L.

APPROVED FOR RELEASE: 08/10/2001

CIA-RDP86-00513R000618610012-6"

"Internal Stresses and the Physical Theory of Strength."

report submitted for the Conference on Solid State Theory, held in Moscow, December 2-12, 1963, sponsored by the Soviet Academy of Sciences.

KRATOCHVIL, J.; INDENBOM, V.L.

The mobility of a dislocation in the Frenkel-Kontorova model.  
Chekhosl fiz zhurnal 13 no.11:814-821 '63.

1. Ustav fyziky pevných látek, Československá akademie věd,  
Praha (for Kratochvil). 2. Ustav krystalografie, Akademie věd  
SSSR, Moskva (for Indenbom).

INDENBOM, V.L.; ORLOV, A.N.

Main objectives of investigations in the field of the physics  
of plasticity and strength. Fiz.met. i metalloved. 15 no.1:5-  
11 Ja '63. (MIRA 16:2)

(Physical metallurgy)

S/032/63/029/002/020/028  
B101/B186

AUTHORS: Nikitenko, V. I., and Indenbom, V. L.

TITLE: Polarization inframicroscope and its application for studying silicon

PERIODICAL: Zavodskaya laboratoriya, v. 29, no. 2, 1963, 222 - 225

TEXT: A polarization infrared microscope is described which consists of an ordinary MMH-4 (MIN-4) polarization microscope with Nicols, a БЭМ-3 (VEI-3) electron-optical converter and an ОМ-24 (OI-24) lamp with infrared filter. The pictures visible on the converter screen are photographed. The stresses were measured quantitatively by means of quartz-, calcite, or mica compensators. Macro- and microstresses with phase differences of 5 - 10  $m\mu$  were found in silicon; phase differences of 2 - 3  $m\mu$  could still be detected. Microphotographs were made of: (1) stress in the cross section of a silicon crystal which, during its growth, was subjected to inhomogeneous plastic deformation; (2) residual stress in the silicon crystal caused by the grinding of the sample; (3) the joint between a silicon lamella of 0.4 mm diameter and an aluminum wire 0.3 mm thick; (4) copper-decorated dislocations

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Polarization inframicroscope and...

S/032/63/029/002/020/028  
B101/B186

in silicon. The determination of stresses in joints between silicon and metal are important for the production techniques of semiconductor apparatus. The polarization inframicroscope can also be used to study the stresses in semiconductors, ferrites, and in mineral ores. There are 5 figures.

ASSOCIATION: Institut kristallografii Akademii nauk SSSR (Institute of Crystallography of the Academy of Sciences USSR)

Card 2/2



S/0070/64/009/001/0074/0083

ACCESSION NR: AP4012277

AUTHOR: Indenbon, V. L.

TITLE: The theory of forming strains and dislocations during crystal growth

SOURCE: Kristallografiya, v. 9, no. 1, 1964, 74-83

TOPIC TAGS: crystal strain, crystal, dislocation, crystal growth, free temperature inflection, lattice defect, latent energy, residual deformation

ABSTRACT: The author has investigated the effect of growth conditions in crystals on the formation and inheritance of strains and dislocations. The structure of a growing layer is determined by all the deformations of the mineral base (substrate), including the free temperature inflection, and by the latent energy of lattice defects. If the latter may be neglected, dislocations fully copy the strains in the growing layer. In the opposite case, these strains may be determined by the dependence of the latent energy on deformation. Depending on the crystal form and the temperature distribution, the residual deformation and strains that form during growth may increase, decrease, change signs, etc. To investigate distortions in the surface layer of a crystal, the author has developed the method

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ACCESSION NR: AP4012277

of effect functions. Computations by means of these functions show that for rectilinear dislocations of any type, inclined to the surface, the self-acting force at  $z = 0$  is always zero. This is extraordinary at first glance, but it is simply explained: in the configuration examined, there is no parameter for length (which should be present in the expression for force). The absence of a self-acting force explains why crystals with few dislocations inherit these during growth with almost no distortion. "The author thanks M. V. Klassen-Naklyudova and A. A. Chernov for valuable suggestions, G. Riper for his analysis of the work, and M. Ya. Dashevskiy for experimental testing of a number of ideas." Orig. art. has: 3 figures and 28 formulas.

ASSOCIATION: Institut kristallografii AN SSSR (Institute of Crystallography AN SSSR)

SUBMITTED: 26Sep63

DATE ACQ: 19Feb64

ECL: 00

SUB CODE: PH

NO REF SOV: 015

OTHER: 008

Card 2/2

INDIENBOM, V. L.; VIDRO, L. I.

"Thermoplastic and structural stresses in glasses."

report submitted for 4th All-Union Conf on Structure of Glass, Leningrad,  
16-21 Mar 64.

ACCESSION NR: AP4028419

S/0181/64/006/004/0992/1000

AUTHORS: Indenbom, V. L.; Vidro, L. I.

TITLE: Thermoplastic and structural strains in solids

SOURCE: Fizika tverdogo tela, v. 6, no. 4, 1964, 992-1000

TOPIC TAGS: thermoplastic strain, structural strain, heat treatment, glass,  
glass BK 10

ABSTRACT: The authors investigated the theory of internal strain, breaking this down to permit evaluation of individual contributions of thermoplastic and structural effects according to conditions of heat treatment. Qualitative evaluations and experimental investigations were made specifically on inorganic glass, but the techniques and basic results are applicable to the broad class of amorphous materials as well as to single crystals. Expressions were found for both thermoplastic and structural strain and the relationship between strain and relaxation time was established. From these relations the optimal method of heat treatment was determined. It is found that the rate of cooling at the extremes of the optimal range diminishes continuously; that is, retarded cooling, accompanied by relaxation of stress, proves to be more suitable than the ordinarily adopted method of

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ACCESSION NR: AP4028419

weakening strains at a constant temperature and of the subsequent uniform cooling.  
Orig. art. has: 2 figures and 20 formulas.

ASSOCIATION: Institut kristallografii AN SSSR, Moscow (Institute of Crystallography  
AN SSSR)

SUBMITTED: 10Sep63

ENCL: 00

SUB CODE: MT, SS

NO REF SOV: 011

OTHER: 003

Card 2/2

ACCESSION NR: AP4028427

S/0181/64/006/004/1039/1047

AUTHORS: Govorkov, V. G.; Indenbom, V. L.; Papkov, V. S.; Regel', V. R.

TITLE: The dislocation theory of the initial stages of deformation in single crystals of germanium

SOURCE: Fizika tverdogo tela, v. 6, no. 4, 1964, 1039-1047

TOPIC TAGS: germanium, dislocation theory, creep, kinetic equation, crystal deformation, temperature dependence, time dependence

ABSTRACT: Beginning with the simple kinetic equation for deformed crystals as used by Gilman and Johnston,  $\dot{\epsilon} = Nbv$ , where  $\dot{\epsilon}$  is the rate of plastic flow,  $N$  the density of mobile dislocations,  $b$  Burgers vector, and  $v$  the velocity of deformation, the authors have studied the theory of dislocations in direct application to slightly deformed crystals of germanium. They have compared the results with experimental data on the relations of deformation and creep to conditions under which the properties are measured. A comparison of measured and computed values is shown graphically in Fig. 1 on the Enclosure. Good agreement was obtained between experimental data and theoretical considerations both for rate of deformation and

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ACCESSION NR: AP4028427

for creep. The authors consider this further confirmation of the validity of the view that the deformational properties of single crystals of germanium may be described by the kinetic theory of dislocations; and they consider their results contrary to the concept that such deformation is due to dislocation rupture at atmospheric impurities. The authors think great promise is to be found in the joint application of phenomenological consideration of dislocation theory, macroscopic study of temperature and time dependence of deformational properties in a crystal, and microscopic study of the deformational mechanism. Orig. art. has: 8 figures and 23 formulas.

ASSOCIATION: Institut kristallografii AN SSSR, Moscow (Institute of Crystallography, AN SSSR)

SUBMITTED: 07Oct63

DATE ACQ: 27Apr64

ENCL: 01

SUB CODE: SS, EC

NO REF SOV: 005

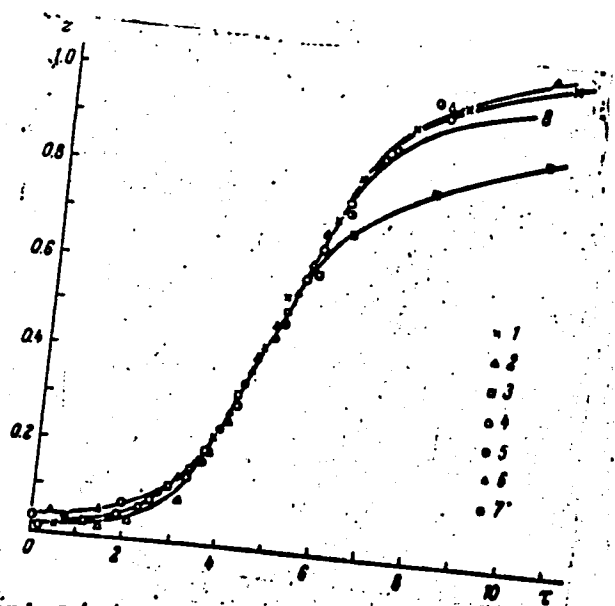
OTHER: 011

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ACCESSION NR: AP4028427

ENCLOSURE: 01

Fig. 1. Curves showing creep in single crystals of Ge, plotted on relative time-displacement axes. Temperature = 520C; stress, in kg/mm<sup>2</sup>: 1 - 10.8; 2 - 9.3; 3 - 7.5; 4 - 5.9; 5 - 5.1; 6 - 4.0; 7 - 3.4; 8 - theoretical curve.



Card 3/3



INDENBOM, V.I.; MOJILEVSKIY, M.A.; ORLOV, A.N.; ROZENBERG, V.M.

Physical nature of the creep of crystalline bodies (review). PMTF  
no.1:160-167 Ja-F '65. (MIRA 18:8)

L 04422-67 EWT(1)/EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) WG/JD/GG  
 ACC NR: AP6034271 EWP(k) SOURCE CODE: UR/0386/66/004/007/0258/0262

AUTHOR: Indenbom, V. L.; Shekhter, E. M.

ORG: Institute of Crystallography, Academy of Sciences SSSR (Institut kristallografi Akademii nauk SSSR)

TITLE: Resonant phenomena in the excitation of internal-stress waves

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prirosheniye, v. 4, no. 7, 1966, 258-262

TOPIC TAGS: elastic modulus, elastic wave, acoustic resonance, laser effect, stress concentration

ABSTRACT: Since an analysis of the equation for the internal-stress field shows that upon suitable choice of even weak sources, the amplitude of the internal-stress waves can be made arbitrarily large by resonance, the authors indicate several examples of resonant excitation of the internal-stress field, which can be realized, in particular with modern methods of irradiating bodies with electromagnetic waves. These are: a) motion of sources with sonic and supersonic speed, where the amplitude of the stresses increases without limit on approaching the generatrix of the radiation cone, b) cumulation of waves following instantaneous application of the field, where two waves can propagate in opposite sides of the boundary of the irradiated region and if the shape of the region is suitably chosen, cumulative compression of the elastic field can take place with unlimited growth of the stress amplitude, and c) motion of a wave

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L 04422-67

ACC NR: AP6034271

packet, where cumulation of the relaxation wave can occur in analogy with the preceding case. It is suggested that relaxation wave cumulation may be the cause of destruction of bodies by laser radiation, where formation of cracks on the axis of a relatively broad beam, which (on the average) does not produce large stresses, is frequently observed. Orig. art. has: 10 formulas.

SUB CODE: 20/ SUM DATE: 06Jul66/ ORIG REF: 003

awm

Cord 2/2

INDENKO, I. F., Cand Agr Sci -- (diss) "Methods of the application of fertilizers in plantings of black currants." Voronezh, 1959. 19 pp; with graphs; (Ministry of Agriculture RSFSR, Voronezh Agricultural Inst); 150 copies; price not given; (KL, 17-60, 163)

INDENKO, I.F.

Foliar feeding of black currants and the possibility of combining it with fungicidal treatment. Fiziol. rast. 7 no.2:198-206 '60.

(MIRA 14:5)

I. I. V. Michurin Scientific-Research Institute of Horticulture,  
Michurinsk.

(Currants—Fertilizers and manures)  
(Fungicides)

INDENKO, I.F., kand. sel'skokhoz. nauk

Compatibility of pear with quince in grafting. Agrobiologiya  
no.4:533-537 J1-Ag '65. (MIRA 18:11)

1. Sochinskaya opytnaya stantsiya subtropicheskikh i  
yuzhnykh plodovykh kul'tur.

YERMILOV, P.I.; GALKINA, Z.V.; KISELEVA, T.A.; INDEYKIN, Ya.A.

Physicochemical basis for the intensification of iron oxide  
dispersion in ball mills. Lakokras. mat. i ikh prim. no.5:  
57-62 '63.  
(MIRA 16:11)

INDEXKIN, Ye.I.

Seborrhea of the meibomian glands. Oft. zhur. 16 no.1:32-34 '61.  
(MEIBOMIAN GLANDS---DISEASES) (MIRA 14:3)



INDEYKIN, Ye.V.

Persistent spasm of accommodation. Vest. oft. 73 no. 1:41-42  
Ja-F '60. (EYE—ACCOMMODATION AND REFRACTION) (MIRA 14:1)

INDEYKIN, Ye.N., kapitan meditsinskoy sluzhby

Treatment of blepharitis with a terramycin ointment. Voen.-medl  
zhur. no.8:79 Ag '61. (MIRA 15:2)

(EYELIDS—DISEASES)

(TERRAMYCIN)

INDEYKIN, Ye.N.

Use of a "lytic cocktail" in the compound treatment of an acute  
attack of glaucoma. Vest.oft. no.4:32-34 '62. (MIRA 15:11)

1. Kafedra oftal'mologii (nach. - prof. B.L. Polyak) Voenno-  
meditsinskoy ordena Lenina akademii imeni S.M. Kirova.  
(GLAUCOMA) (ARTIFICIAL HIBERNATION)

INDEYKIN, Ye. N.

"On the Use of Effective Local Anesthesia in Cases of Eye Injuries".

Voyenno Meditsinskiy Zhurnal, No. 4, 1962

INDEYKIN, Ye.N.

Use of various lytic mixtures in surgery for eye injuries  
and their sequelae. Vest. oft. 76 no.3:64-65 My-Je '63.  
(MIRA 17:2)

1. Kafedra oftal'mologii (nachal'nik - prof. B.L. Polyak)  
Voyenno-medsitsinskoy ordena Lenina akademii imeni Kirova.

INDEYKINA, T.A.; BOLDYREVA, M.V.

Refining of sunflower seed oil with sodium silicate. Masl.-  
zhir. prom. 29 no.10:33-35 0 '63. (MIRA 16:12)

1. Millerovskiy masloekstraktsionnyy zavod.

INDIC, S.

Technical control of the KR-3. p. 810.

VJUNO-TEHNIKI GLASNIK. Beograd, Yugoslavia. Vol. 3, no. 11, Nov. 1955.

Monthly List of East European Accessions (EPAI) LC, Vol. 3, no. 9, Sept. 1959.

Uncl.

INDIC, S.

"Imitation of fire in antiaircraft artillery."

p. 655 (Vojno-Tehnicki Glasnik) Vol. 5, no. 9, Sept. 1957  
Belgrade, Yugoslavia

SO: Monthly Index of East European Accessions (EEAI) IC. Vol. 7, no. 4,  
April 1958



INDICHENKO, I.G.

ZAITOV, I.R.; INDICHENKO, I.G.

Stereoscopic cameras for measuring purposes. Zhur. nauch. i prikl.  
fot. i kin. 2 no.3:212-218 My-Je '57. (MLRA 10:6)  
(Photogrammetry)

INDICHENKO I. G.

**AUTHOR:** Peklitsov, Ye. M., Engineer 807/154-58-2-18/22

**TITLE:** Scientific and Technical Conference of the NIIDA i K (Nauchno-  
tekhnicheskaya konferentsiya NIIDA i K) III

**PERIODICAL:** Izvestiya vysshikh uchebnykh zavedeniy. Geodesiya i  
aerofotos"yemka, 1958, Nr 2, pp 115-116 (USSR)

**ABSTRACT:** In the section for aerophoto-geodetical and photogrammetrical  
instruments the following persons gave lectures: Professor  
M. M. Maslov on "New Tendencies in the Production of Objectives  
in Instruments Used for Cartographical Aerial Photography."  
Professor A. N. Lebedev: "On Three-Dimensional Phototriangula-  
tion and the Use of Electronic Computers." Professor A. P.  
Mashkovich: "On Some Theoretical Statements With Regard to Que-  
stions of Photogrammetry in Connection With the Production of  
Precision Instruments for These Purposes." Engineer M. V. Maslov:  
"The Radio-Synchronizer for Simultaneous Photos From Two Air-  
planes." Professor N. S. Lyalikov: "Apparatus and Laboratories  
for Aerial Methods of the AS USSR for the Study of Spectral  
Intensity." Doctor V. P. Kabanov: "Making the Transformation  
of Aerial Photographs Automatic." Engineer L. P. Churayev:  
"Automatic Control of the APA Reprocessor." Engineer I. G.

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Indichenko: "Stereophotogrammetrical Coupled Cameras." In a  
joint session of the sections for geodetical and photogramme-  
trical instruments Engineer L. Ye. Mindlin read a paper on "The  
Method of Heterodyne Photos in Geophysical Photos." Doctor  
B. N. Rodionov reported on "The Problem of Making Aerial Pho-  
tography Automatic." Altogether, there were 38 lectures and reports given. 32 del-  
egates participated in the discussions.

AUTHORS: Zaitov, I. R., Candidate of Technical Sciences, Indichenko, I. G., Engineer SOV/154-58-1-B/22

TITLE: The Spectral Reflectance of Some Types of Soil (O spektral'noy otrazhatel'noy sposobnosti nekotorykh tipov pochv)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Geodeziya i aerofotos'yemka, 1958, Nr 1, pp 57-64 (USSR)

ABSTRACT: The photographic qualities of air photographs depend on the accuracy of the photogrammetric measurements. In perfecting the photographic qualities of air photographs, however, the optical properties of the objects to be photographed are highly important. The first tests in this field (in particular, as to recognizing the spectral reflectance of the soil) were carried out by G. A. Tikhov, Corresponding Member, Academy of Sciences, USSR. Later on they were continued by Ye. L. Krinov. The reflectance of solid wooded areas was investigated by A. K. Pronin. In 1955 and 1956 the investigations were continued systematically by the Laboratoriya aerofotometodov kafedry kartografii MGU (Laboratory of Aerophotographic Methods, Department of Cartography, Moscow State University).

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The Spectral Reflectance of Some Types of Soil

S07/154-58-1-8/22

These tests were performed by means of reflector monochrometer (Type BMP-2). The results of the tests were reproduced in a diagram. It was discovered that all terrains tested (ground sections) have a comparatively low reflection coefficient. The reflectance largely depends on the respective surface character of the soil, also soil humidity exercising an essential influence on the soil reflectance, which could be observed with certainty in the test. Dry soil reflects twice as much as humid soil, although the diagrams do not show any remarkable change in this case. There are 15 figures.

ASSOCIATION: Moskovskiy Gosudarstvennyy universitet imeni M. V. Lomonosova  
(Moscow State University imeni M. V. Lomonosov)

Card 2/2

AUTHORS:

*Indichenko, I. G.*

98-58-4-13/18

Zaitov, I.R., Candidate of Technical Sciences; Indichenko, I.G.  
and Knizhnikov, Yu.F., Engineers

TITLE:

Using Phototheodolites for Obtaining Plans of the Water Surface in the Spanning of the Angara River (Primeneniye fototeodolita dlya polucheniya planov vodnoy poverkhnosti pri perekrytii r. Angary)

PERIODICAL:

Gidrotekhnicheskoye Stroitel'stvo, 1958, Nr 4, pp 49-51

ABSTRACT:

The photogrammetric method is being increasingly applied in the investigation of wave formations on seas, lakes and reservoirs. In many cases this method appears to be the only one for registering and measuring the wave relief; this method is also used for investigating the form of the free water surface over the embankment of a river dam. Such was the case in 1956 at the construction of the Irkutsk Hydroelectric Power Plant, when photogrammetry was applied with a view to obtaining plans of the water surface below the pontoon bridge across the Angara river. The stereo-photography of a water surface of 10 x 150 sq meters was carried out with two phototheodolites "FTN" with an electrically-synchronized shutter-release device; panchromatic photo plates with 100 units (Gost) sensitivity were used, making a total of 18 photos. Each stereo couple was

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98-58-4-13/18

Using Phototheodolites for Obtaining Plans of the Water Surface in the  
Spanning of the Angara River

divided into three sections - the first consisting of small waves and surf, the second - of crests and hollows of stabile waves. The photogrammetric plotting of the perspective model of the water surface in the orthogonal plan at a scale 1:300 was done on the large stereo-autograph of Zeiss. Figure 3 shows one of these plans and Figure 4 - the corresponding phototheodolite picture. To avoid blurred photos it is advisable to use a shutter speed of not less than 1/25 sec. Dead angles can be avoided by taking stereo-photos from two basic points with 4 phototheodolites which must be equipped with synchronized shutter release devices. There are 4 figures.

AVAILABLE: Library of Congress

Card 2/2

1. Phototheodolites-Applications 2. Water waves-Analysis

3(4).

AUTHOR:

Indichenko, I. G., Chief Engineer

SOV/154-59-2-16/22

TITLE:

Stereophotogrammetric Twin Cameras (Stereofotogrammetricheskiye sparennyye kamery)

PERIODICAL:

Izvestiya vysshikh uchebnykh zavedeniy. Geodeziya i aerofotos"yemka, 1959, Nr 2, pp 109-111 (USSR)

ABSTRACT:

The present development calls for a far-reaching introduction of the stereo-photogrammetric method for non-topographical purposes. It is of interest to use this method for the measuring of objects which are at a distance of 0.5-20 m from the camera. Since the existing photogrammetric cameras are unsuitable for taking pictures of objects so close, without considerable changes in their construction, the Laboratoriya aerofotometodov (Laboratory for Methods of Aerial Photography) developed some designs of stereo-photogrammetric twin cameras, which were also built. Besides, the question of creating a universal design has been solved. With its help it is possible to deal with problems concerning the maximum utilization of the stereo-photogrammetric method in the various fields of science and technology. It is also possible to develop by trial and er-

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Stereophotogrammetric Twin Cameras

SOV/154-59-2-16/22

for the necessary characteristics for the design of cameras for special purposes. Three types of stereo-photogrammetric twin-cameras are shown. 1) The SKI-3 Camera consists of two identical photographic cameras which are mounted on a metal prism. They are adjustable alongside the prism, with the optical axes remaining parallel. 2) The SKI-4 Camera has a stable base of 65 mm, the lenses are fitted with synchronized central shutters. 3) The SKI-5 Camera, Patent Nr 117144 dated October 29, 1958, consists of two identical cameras which are mounted in parallel-ogram form on two equal arms. The base is adjustable between 120 and 1000 mm. All three cameras are fitted with variable focal lengths, i.e. 105 - 105 + 25 mm, 40 - 40 + 10 mm, and 50 - 50 + 10 mm. When determining the distance, all three constructions secure at a certain distance from the objective and at a certain size of the basis, a relative error of 1/1000 - 1/2000. The accuracy can still be increased by using films of a higher definition (the Mikrat-type), which are then evaluated with special instruments under large magnification. The cameras here described are small, light and can be used for objects at a distance of 0.5-20 m. There are 3 figures.

Card 2/3



Stereophotogrammetric Twin Cameras

SOV/154-59-2-16/22

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova  
(Moscow State University imeni M. V. Lomonosov)

Card 3/3

3(4), 25(1)

SOV/154-59-5-13/17

AUTHORS:

Zaitov, I. P., Docent, Candidate of Technical Sciences,  
Indichenko, I. G., Engineer

TITLE:

A Method Used to Determine the Conjugated Focal Length and the  
✓ Photogrammetric Distortion of Measuring Cameras Intended for  
Close-ups

PERIODICAL:

Izvestiya vysshikh uchebnykh zavedeniy. Geodeziya i  
aerofotos"yemka, 1959, Nr 5, pp 145-148 (USSR) ✓

ABSTRACT:

Since there are only goniometers available for the focusing of  
a phototheodolite for infinity, the development of a device  
with adjustable focal length proved to be necessary for close-  
ups. The authors report on the development of such a device by  
the Laboratoriya aerofotometodov kafedry geodezii i kartografii  
Moskovskogo Gosudarstvennogo Universiteta im. M. V. Lomonosova  
(Laboratory for Methods of Aerial Survey of the Chair of  
Geodesy and Cartography of Moscow State University imeni M. V.  
Lomonosov). These devices allow to determine the focal length  
and the photogrammetric distortion of the camera when photo-  
graphing objects at a distance of 1 m up to infinity. Its  
principal parts are collimator 1, focused for infinity, a

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A Method Used to Determine the Conjugated Focal Length and the Photogrammetric Distortion of Measuring Cameras Intended for Close-ups

goniometer used to level the instrument to be adjusted, and collimator 3 with variable focusing. These instruments are mounted on an OS-2-type optical bench (Figs 1-4). The total device is adjusted by the usual optical methods. Experiments proved its applicability. There are 4 figures. ✓

ASSOCIATION: Moskovskiy ordena Lenina i ordena Trudovogo Krasnogo Znameni Gosudarstvennyy Universitet im. M. V. Lomonosova (Moscow Order of Lenin and Order of Red Banner State University imeni M. V. Lomonosov)

SUBMITTED: October 30, 1958

Card 2/2

INDICHENKO, I.G.; TAMITSKIY, E.D.

A new copying apparatus for the printing of colored and spectral  
aerial photographs. Geod. i kart. no. 5:30-35 My '61. (MIRA 14:6)  
(Color printing) (Map printing)

24,3300

3,4000 (4303)

40020

S/035/62/000/008/090/090  
A001/A101

AUTHORS: Valeshko, G. I., Indichenko, I. O., Trukhanenko, M. V.

TITLE: New devices for geographic deciphering and transferring contours from aerial photographs onto maps

PERIODICAL: Referativnyy zhurnal, Astronomiya i Geodeziya, no. 8, 1962, 34, abstract 80275 (In collection: "Geogr. i kh.-vo", v. 10, Moscow, 1961, 75 - 77)

TEXT: New devices for compiling general geographic maps are described; they were developed by the laboratory of aerophotomethods at the Geographical Division of MGU. In distinction from existing stereoscopes, the ПЧМ-2 (PSI-2) mirror stereoscope ensures complete survey of the entire overlapping area of a pair of aerial photographs. Small size of the device makes it possible to carry it in the side pocket of an observer. The visual field of the stereoscope is 110 x 160 mm. Simplest measurements can be performed under the stereoscope by means of devices of parallax-meter type. Stereo spectacles are mounted in any standard rim into which plane-parallel glasses are inserted. Optical wedges with refraction angle of 14 - 18° are glued to the lower parts of the glasses, the upper part of the glasses, intended for observation of the country, can be smoked, if a highly lighted country.

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New devices for geographic deciphering and...

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is observed. Such a design makes it possible to observe the stereoscopic country model from aerial photographs and the country directly. To determine, from aerial photographs, relative elevations and slopes on the country, a stereo altimeter and a stereo declinometer have been developed. The stereo altimeter makes it possible, without additional calculations, to determine mutual elevations up to 400 m directly on the device. Measurements of slopes of the country are made with the stereo declinometer by means of the stereoscope on aerial photographs of 18 x 18 cm size with elliptical marks, and measurements of slopes oriented along the direction of bases with dash marks. A strictly definite angle of ellipse turn or dash marks corresponds to every certain slope angle of the country. On this basis, nomograms have been plotted which are used for slope angle determination.

V. Agafonov

[Abstracter's note: Complete translation]

Card 1/2

INDICHENKO, I.G.

Bifocal sterec-glasses. Biul.nauch.-tekh.inform VIMS no.1:98-99  
'63. (MIRA 18:2)

KIRILLOVA, A.A.; BARGMAN, S.Ye.; INDICHENKO, L.D.

Polyacrylamide glue for gluing labels on glass containers. Kons.1  
ov.prom. 17 no.10:41 0 '62. (MIRA 15:9)

1. Ukrainskiy nauchno-issledovatel'skiy institut konservnoy  
promyshlennosti (for Kirillova). 2. Odesskiy konservnyy zavod  
imeni V.I.Lenina (for Bargman, Indichenko).  
(Adhesives)



INDICHENKO, L.N.,

"Spectral Analysis of Microscopic Inclusions, Coatings, and Precipitates"

Zhur. Anal. Khim. 2, No. 4, 1947

Lab. Geochemical Problems im V.I. Vernadskiy

INDICHENKO, L.N.

"Method of Spectral Analysis of Sulfide and Oxide (Iron and Manganese) Ores"

Dok AN 59, N. 6, 1948

Lab. Spectral Analysis, Inst. Geol. Sci. AS USSR

INEICHENKO, L. N.

Practical manual for deciphering ore and mineral spectrograms. Moskva, Gos.  
izd-vo geol. lit-ry, 1951. 77 p. (54-35243)

QC453.I5

INDICHENKO, L. N.

USSR/ Minerals - Mineralogy

Card 1/1 Pub. 22 - 44/60

Authors : Indichenko, L. N.

Title : The semi-quantitative spectral analysis during mineralogical and geochemical investigations

Periodical : Dok. AN SSSR 100/4, 775-778, Feb 1, 1955

Abstract : The development of a semi-quantitative spectral analysis method for mineralogical and geochemical investigations is reported. The data obtained with the new method were found to be equal in accuracy to those obtained by other accurate measuring methods. The new method makes it possible to determine small and large contents (up to 10%) of minerals, ores and other associations. Six references: 3 English, 1 French and 2 USSR (1884-1937). Tables; graph.

Institution : .....

Presented by : Academician D. I. Shcherbakov, January 7, 1954

INDICHENKO, Lyubov' Nikolayevna; LIPIS, L.V., otv. red.; MERGOSOV, G.G.,  
red. 1<sup>st</sup>-va; BRUZGUL', V.V., tekhn. red.

[Spectrum analysis of minerals] Spektral'nyi analiz mineral'nykh  
veshchestv. Moskva, Izd-vo Akad. nauk SSSR, 1960. 188 p.  
— Supplement 64 plates. (MIRA 14:10)  
(Minerals—Spectra)

INDICHENKO, N.P.

Improve sugar beet seeds production. Sakh. prom. 31 no.6:50-52 Jo '57.  
(MIRA 10:6)

1. Ministerstvo pishchevoy promyshlennosti tovarov SSSR.  
(Sugar beets)

INDICHENKO, N. P.

For a good crop of sugar beet seeds in 1958. Sakh. prom. 32  
no.4:55-56 Ap '58. (MIRA 11:6)

1. Glavpishchesbytsyr'ye pri Gosplane SSSR.  
(Sugar beets)

INDICHENKO, P.D., dotsent; YANCHUK, V.Z., kandidat yuridicheskikh nauk  
vidpovidal'nyy redaktor

[Contractual relations between machine-tractor stations and collective  
farms at a new stage] Dohoviri vidnosyny MTS z kolhospamy na novomu  
etapi. [Kyiv] Vyd-vo Kyivs'koho derzh.univ. im T.H.Shevchenka, 1955.  
45 p. (MIRA 9:8)

(Collective farms)  
(Contracts)

(Machine-tractor stations)



INDICHENKO, P.D.

ALEKSANDRENKO, Oleg Vasil'yevich [Aleksandrenko, H.V.]; INDICHENKO, P.D.,  
kand.yuridichnikh nauk, red.; GANUSETS', O.I., red.

[Reorganization of management in industry and construction work]  
Reorganizatsiia upravleniia promyslovosti i budivystvom. Kyiv,  
To-vo dlia poshyrennia polit.i naukovykh znani' URSS, 1957. 51 p.  
(Russia--Industries) (MIRA 11:2)

PUSKAS, Gh., prof.; INDIG, Bianca, dr.; METZ, Olga, F.dr.; NUSSEBAUM, Vera, dr.;

Changes in blood protein and lipid patterns in diabetic children in relation to the stage of metabolic compensation. *Pediatria (Bucur.)* 13 no.6:481-490 N-D '64

1. Lucrare efectuata in Clinica de pediatrie, Tg. Mures (conducator: prof. Gh. Puskas, doctor in stiinta medicale).

PUSKAS, Gh., prof.; METZ, Olga, dr.; INDIG, Blanka, dr.

Tolerance of fats and their influence on circulating lipids in dystrophic infants. Pediatria ( Bucur.) 14 no.3:213-222 My-Je '65.

1. Lucrare efectuata in Clinica de pediatrie, Tirgu Mures (conducator: prof. Gh. Puskas, doctor in stiinte medicale).

INDIKOV, E.M.; SOLOVKIN, A.S.; TETERIN, E.G.; SHESTERIKOV, N.N.

Demixing in the system HCl - H<sub>2</sub>O - tri-n-butyl phosphate - diluent.  
Zhur.neorg.khim. 8 no.9:2187-2189 S '63. (MIRA 16:10)

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Demixing in the system sulfuric acid-water-tri-*n*-butyl  
phosphate-diluent. Zhur. neorg. khim. 9 no.12:2786-2788  
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INDIKOV, E.M.; IONOV, V.I.; SOLOVKIN, A.S.; TETERIN, E.G.; SHESTERIKOV, N.N.

Demixing in the system  $\text{HClO}_2 - \text{H}_2\text{O}$  - tri-n-butyl phosphate -  
diluent. Zhur.neorg.khim. 10 no.11:2569-2571 N '65.

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<sup>G.P.</sup>  
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"Psychosis Due to Mushroom Poisoning. Nevropatologiya i Psikhatriya, 19,(1950),  
3, 61-62.

S): Translation-2524467, 30 Apr 1954.

~~INDIKT, Ye., inzh.~~

Automatic washing of motortrucks. Avt. transp. 36 no.2:18-19 F '51.  
(Motortrucks--Maintenance and repair) (MIRA 11:2)



INDIKT, Ye.; SOBOLEV, V.

Automatic washing of motortrucks. Avt.transp. 38 no.1:19-22  
Ja '60. (MIRA 13:5)

1. Vtoraya avtobasa Mosstroytransa.  
(Motortrucks--Maintenance and repair)

INDIKT, Yefim Aleksandrovich; SOBOLEV, Viktor Pavlovich; GRECHKO,  
V.M., red.; NIKOLAYEVA, L.N., tekhn. red.

[Automatic line for washing trucks] Avtomaticheskaya liniya  
moi ki gruzovykh avtomobilei. Moskva, Nauchno-tekhn. izd-vo  
M-va avtomobil'nogo transp. i shosseinykh dorog RSFSR, 1960.  
43 p. (MIRA 15:3)

(Motortrucks—Cleaning)

INDIKT, Ye., inzh.; SOBOLEV, V., inzh.

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(Washing machines)

INDIKT, Ye.; SOBOLEV, V.

Motortruck for the transportation of building mortar.  
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